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and the text is written with considerable literary ability.——Mr. Ridgway gives a list of the species of birds of Illinois which is critical and very full, including 341 species.

ENTOMOLOGY.[1]

THE EGG-CASE AND LARVA OF HYDROPHILUS TRIANGULARIS SAY. As the nidus and young of this beetle do not appear to have been observed, a few notes gathered from an examination of several egg-cases and of larvæ hatched from them may be of interest. The cases were collected about the first of June, 1876, from a small pool of water in the Normal School grounds at this place. A half dozen were obtained floating at the surface of the water, with bits of weeds and dead leaves attached to the upper surface as floats (Fig. 1). In no case were they secured to living plants, as the egg-case of *H. piceus* is said to be. In one instance a female was discovered finishing her case. The last touches were being put on the expanded lower portion of the "horn" (Fig. 1, *b*), this part of the latter being then of a rich yellow color. The nidus and its maker were lifted gently in the hand and carried a distance of about one hundred yards; and so absorbed was the beetle that she continued her work, and on being put into a vessel of water finished her task. When the case was next observed the yellow material had been concealed by a brown gummy coating.

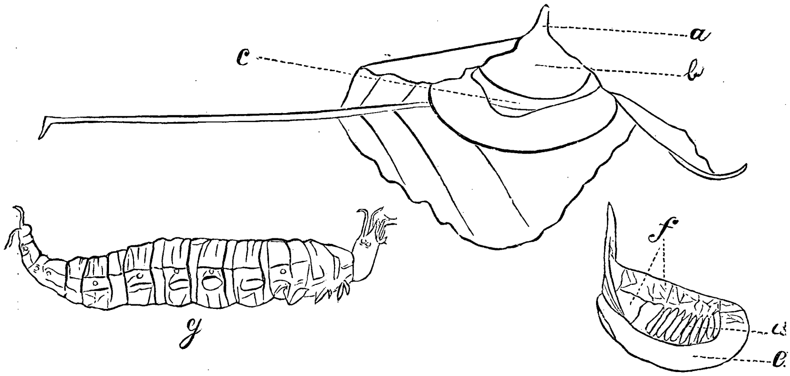

FIG. 1.—Eggs, egg-case and larva of Hydrophilus, nat. size; *a* air-tube, *b* expanded lower portion of tube; *c* opening into nidus; *d* eggs shown in vertical section of nidus; *e* empty under portion of the case; *f* chambers above eggs; *g* larva. (Garman *del.*)

The surface of the egg-case is smooth, light brown, and resembles very closely that of the nidus of the large black and yellow spider, *Argiope riparia* (?). Viewed from above or below, the outline is a good circle. The diameter is about 20^{mm}, the depth about 14^{mm}. The spine-like process (Fig. 1, *a*) which arises from what may be termed the front of the case is of a dense horny nature, quite unlike the remainder of the case. It expands below into a hatchet-shaped plate (Fig. 1, *b*). The spine indeed is formed by this plate narrowing and folding backwards above the case until its edges almost meet, thus forming a partial tube, which, as will be seen later, facilitates the entrance of air into the interior. The length of the tube, as also the shape of the plate, varies somewhat. Below the hatchet-shaped expansion is a narrow opening (Fig. 1, *c*) into the case, allowing the water free passage from without and permitting the escape of the larvæ.

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[1] This department is edited by PROF. C. V. RILEY, Washington, D. C., to whom communications, books for notice, etc., should be sent.

The eggs form a discoid mass suspended from the roof of the nidus. They are all placed vertically and arranged closely in a single layer. (See Fig. 1, *d.*) Specimens (in alcohol) are cylindrical, about 4^{mm} in length and about 1^{m} in diameter. One hundred and seven were counted in one nidus. The mass is surrounded by a rather loosely woven silken coat, while each egg is wrapped separately in a coat of similar character. Below, at the sides, and behind the mass, is left a vacant space (Fig. 1, *e*) into which the opening in front gives access to the water. The silken material above and in front of the eggs is so disposed as to form large cells (Fig. 1, *f*) and these connect with the tube through which air is admitted.

The chief object of the peculiarly constructed case appears to be to ensure a supply of air to the newly hatched larvæ. As will be seen by reference to the figures, this object is attained by excluding water from, and admitting air into, the upper part of the case, and by attaching a float to the upper surface. This keeps the top of the case at the surface of the water while the air-tube projects above.

In the very young larvæ, the head is relatively wider and larger every way than in older examples; the body is covered by a coat of short, fine pubescence, becomes gradually wider from behind forwards, and the general color is a uniform grayish-brown, becoming lighter beneath. In older examples, the body is sensibly narrowed before and behind. In the largest specimen examined, the pubescence is wanting, and there is a faint dorsal line, with a broader waved line bordered outside with dark on each side of it. The head is so attached to the body as to project obliquely upwards; it is reddish-brown, with obsolete darker shades. The mandibles and labium are narrowly edged with black. The legs are of the same color as the head. The skin is minutely roughened and deeply wrinkled. The lateral appendages of other Hydrophilus larvæ are represented by elevations so slight as to be scarcely visible. From the under side of the last segment of the abdomen in this species, arise two light-colored, cylindrical, flexible appendages, about equal in length to the first joint of the antennæ. (For the larva, see Fig. 1, *g*.)

Figure 2, *a* renders a detailed description of the mouth-parts unnecessary. A noticeable characteristic is the difference in size and shape of the right and left mandibles. The right is longer, more slender and strongly curved, and has a bicuspid prominence on the cutting edge. The left one has a single minute tooth. The maxillæ are the most prominent mouth parts, and are probably chiefly useful as palpi. They are especially large in the youngest larvæ. The terminal palpial joint and the small appendage of the second joint have areas at their apices from which arise tactile rods. The inner edges of the long basal joints of both the maxillæ and antennæ are beset with numerous straight hairs. Lateral basal prominences of the labium are roughened with minute, depressed, tooth-like processess.

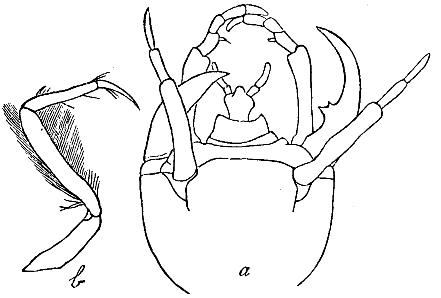

FIG. 2. — Head and leg of Hydrophilus larva, enlarged; *a*, head and mouth parts; *b*, leg. (Garman *del.*)

The legs do not vary perceptibly; all have the femora supplied with fringes of soft hair (Fig. 2, *b*).

The striking feature of the tracheal system is two large longitudinal trunks, one on each side of the middle line of the body (Fig. 3 *a*, diagram). They open in large spiracles under the posterior upper edge of the last abdominal segment but one (Fig. 3, *b*). Properly it is perhaps the antepenult, as Gegenbaur states that spiracles are never borne by the two terminal abdominal segments. The balance of authority seems to be in favor of these being the only spiracles in the larval Hydrophilus. In the case of the larvæ of two species examined this is certainly not true; for besides the large terminal pair, nine pairs of spiracles, with branches running to them from the large trunks, can be counted. One of these

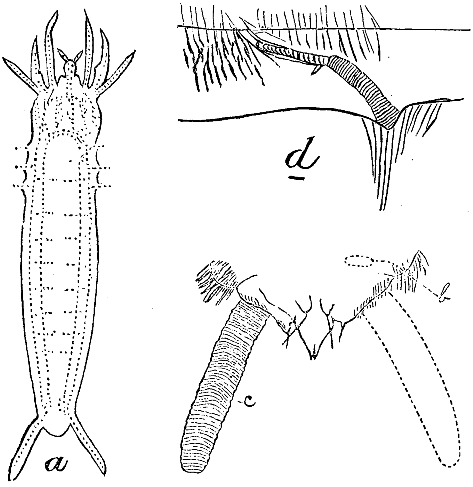

FIG. 3.—Tracheal system of Hydrophilus larva. *a*, diagram showing the main branches of tracheal system; *b*, opening of large spiracle; *c*, terminal appendage; *d*, stigmatal branch of tracheæ. (Garman *del.*)

larvæ has lateral filaments a sixteenth of an inch long, but there is no connection between them and the stigmatal branches of the tracheæ. (Fig. 3, *d*, shows one of the branches.) The latter open immediately over the large trunks some distance above the lateral filaments. They are very short, are comparatively small, pass directly upward to the skin from the trunks, and consequently a good view of them can scarcely be obtained without dissection, certainly not without rendering the specimens transparent. They can be best seen by cutting out a strip of skin above the trunks, placing it, with the air-vessels attached, under the microscope, and rolling one of the trunks aside with a needle. The first spiracles are situated in the anterior border of the mesothorax, the second in the anterior border of the metathorax, and following these there are seven others in the abdomen besides the large terminal pair, making ten pairs in all.

Westwood states that the terminal appendages of the abdomen (Fig. 3, *c*) are respiratory organs. With this statement in mind I was prepared to see them well supplied with tracheæ, and was surprised to find, instead, but a simple branch of not more than one-twentieth the diameter of the appendages.

The trunks give off numerous short branches in the abdomen and thorax near the points from which the branches proceed to the stigmata. At the posterior part of the prothorax the trunks divide, one large branch on each side continuing forward till near the front of the head, where branches are given off supplying the mandibles, maxillæ and antennæ. At about the point at which these branches leave the main branch, an arch is formed by a branch from each side curving forwards towards the middle line and there uniting. The anterior portion of this arch lies within the base of the labium, where branches pass forward from it into the labial palpi. The other branches produced by the division of the trunks form a large arch, the anterior portion of which lies within the base of the head. Branches from this arch pass along each side of the œsophagus, while others supply the sides of the head and the region of the eyes. (See diagram, Fig. 3, *a*.)—*W. H. Garman, Normal, Ills.*

ANTHROPOLOGY.[1]

COMPARATIVE BIOLOGY.—The comprehensive term by which the study of the natural history of man is designated has become well nigh settled in its application. In the summaries which have been published in the NATURALIST, the Smithsonian Report, and Baird's Annual Record, it has been found convenient to adopt the following subdivisions of Anthropology: 1. Anthropogeny, including both the laws of environment and inheritance as effecting and affecting our race; 2. Archæology, a term well understood; 3. Anatomy, specific and comparative; 4. Psychology, involuntary

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